LIBRARY
STATE PLANT BOARD

UNITED STATES

DEPARTMENT OF AGRICULTURE

BUREAU OF
ENTOMOLOGY AND PLANT QUARANTINE
NEWS LETTER

VOLUME VII

5

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR MARCH 1940

Vol. VII, No. 5 (Not for publication) May 1, 1940

ADMINISTRATION

Bureau Appropriations

The bill to provide appropriations to the Department for the fiscal year 1941 passed the Senate and is now being considered in conference. The bill as it passed the Senate provides more funds for the Bureau than would be provided by the bill as it passed the House. The amount of the bill as it passed the Senate is $6,773,093, being $1,128,292 above the amount provided in the House bill. The increases provided in the Senate above the House bill are:

Fruit Insect Investigations-- For continuing studies in Georgia and Texas on insects affecting pecans	$14,000
Mexican Fruitfly Control-- Restoration of increase in Budget estimate	15,000
Forest Insect Investigations-- Partial restoration of Budget estimate	25,000
Cereal and Forage Insect Investigations-- Expanding studies on grasshoppers and Mormon cricket	25,000
Barberry Eradication-- Restoration of part of the Budget estimate	25,000
Pink Bollworm Control-- Increase above Budget estimate	382,808
White-fringed Beetle Control-- (New item included in Budget estimates)	600,000
Insects Affecting Man and Animals-- Restoration of Budget estimate	31,500
Insecticide and Fungicide Investigations-- Restoration of Budget estimate	9,984
Total Senate increases above House bill	$1,128,292

The B. E. P. Q. Exhibit

The Bureau of Entomology and Plant Quarantine has on display in the Patio an exhibit of some of the outstanding individuals of the more than 750,000 known kinds of insects in the world. A few insects of unusual size, bizarre form, or striking color are displayed in a glass case. Among them are one of the largest moths, the Caesar moth, which measures 10½ inches between wing tips, and one of the smallest, European Rumex leaf miner, which is barely visible to the naked eye. Included in this display are such insects as moths, weevils, beetles, grasshoppers, cicadas, wasps, and bees. The colors of some are extraordinary, with such combinations as yellow and brown, yellow and purple black, ebony black with shadings of pale blue, and blue and green iridescent colors. Among the most beautiful of all those shown are two moths, one of deep shining blue with a blue-black border, and another of dark purple-blue and American Beauty red, tipped in velvet black.

One of the most beneficial insects, the honeybee, has its place in the exhibit, too. Inside a glass-walled hive, a colony of bees goes into its regular routine of honey making, oblivious of spectators. And for contrast to this modern beehive, an old fashioned straw skep is also displayed.

Most of the insects in the exhibit are those that add to the annual billion-dollar losses from insect pests. Potential pests are also included. The pink bollworm and the damage caused by it are displayed, along with a model of the machine developed by the Bureau to separate the larva of the pink bollworm from gin trash, making it possible to locate incipient infestations. Trash and worms go in at one end. The trash comes out in one place and the worms in another.

The way the Japanese beetle destroys many kinds of plant life is shown, as well as research in progress to work out effective control measures. A small mechanical man gives a demonstration of how to treat lawns with chemicals to destroy the Jap beetle grubs.

In the cross section of a frame house, models of termites move up and down through the tunnels they have carved in the wood. Next is the cross section of a house termite-proofed to keep out these insects. On one of the displays a short interesting history of the termite is given. The queen termite is the largest, the king, next largest. These are cared for by the workers. The soldier termites, next in size to the king, are protectors only and are dependent upon the workers for food.

Paintings of flower and vegetable insect pests are on display, as well as samples of their destructive work. A miniature duster to control the pea weevil and a miniature trap with which the flight habits of certain truck crop insect pests can be determined are shown. Depicted also are the methods entomologists use in studying the anatomy of insects. This calls for delicate dissecting instruments and special apparatus for analyzing insect blood and recording insect heart beats.

Plant diseases subject to Federal plant quarantines have a place in the exhibit. White pine forms the background for a diorama on one of the white pine's greatest threats--white pine blister rust.

The life history of the gypsy moth is visibly told by specimens from larvae to adult stage placed on a stump of a tree.

The extensive Federal-State control campaigns to suppress certain insect pests and plant diseases are also shown. These include the campaigns against the grasshopper and the Mormon cricket in the West, the white-fringed beetle in the South, and the Dutch elm disease in the East.

The exhibit is extremely attractive, and comprehensible to the layman, and shows an interesting phase of the work of the Department. It is well worth while. (Agricultural Exchange, Apr. 5, 1940.)

FRUIT INSECT INVESTIGATIONS

Raisin moth larvae in waste plums.--Samples of fallen plums, taken by Dwight F. Barnes, Charles K. Fisher, and George H. Kaloostian, of the Fresno, Calif., laboratory, gave data on the population per acre of larvae of Ephestia figulilella Greg. in 2 orchards of the early Beauty variety. Picking began on May 26. Much of the fruit was allowed to go to waste, both because of prorate rules as to size and on account of competition when later varieties ripened. Of 340 adults which emerged from the samples, 339 were raisin moths and 1 was E. elutella (Hbn.), the tobacco moth. All parasites which matured were the ichneumonid Idechthis canescens (Grav.). Some of the data are shown in the following table.

Date of sample collection	Estimated larvae per acre	Parasitization	Potential emergence of moths per acre
	Number	Percent	Number
Anderson orchard:			
July 24----------	231,840	12	204,019
Aug. 1-----------	143,451	20	114,761
Aug. 8-----------	63,756	43	36,341
Aug. 15----------	28,980	25	21,735
Dudley orchard:			
July 24----------	34,228	7	31,832
Aug. 4-----------	26,703	18	21,896
Aug. 11----------	8,127	0	8,127

New laboratory for study of Comstock's mealybug on apple.--A new laboratory is being established at Charlottesville, Va., for a study of Pseudococcus comstocki Kuw. This insect has been known for a number of years as a pest of umbrella catalpa and has also been recorded on a wide variety of other hosts. In the last few years it has become increasingly important in apple orchards in widely scattered localities from South Carolina to New York and as far west as Ohio. The chief damage caused by this insect consists of the production of large quantities of honeydew, which supports the growth of a sooty mold. This causes the stunting and cracking of the fruit and such serious disfigurement that it is reduced to cull grade. In parts of some orchards the injury has been so severe that the crop is unmarketable. In the project just being started greatest emphasis is to be placed on biological control. Certain species of parasites have already been brought in from Japan by the Division of Foreign Parasite Introduction. These are being held at the Moorestown, N. J., laboratory, and releases will be made at opportune times during the season. An experiment is also being planned with the utilization of one of the ladybird beetles, which has proved effective on related species of mealybugs on citrus in California. Although this ladybird beetle is unlikely to survive the eastern winters, restocking might prove to be a profitable annual practice. G. J. Haeussler, who has been engaged in work with the oriental fruit moth parasites at Moorestown, has been transferred to Charlottesville to take charge of the new project.

MEXICAN FRUITFLY CONTROL

Fruitflies appear early in March.--The usual spring infestation of Anastrepha ludens Loew in the lower Rio Grande Valley began to appear early in March and at the end of the month larvae had been found in 84 plantings. All of these infestations occurred in grapefruit and in many of them only 1 fruit was infested. The catch of adults in traps mounted rapidly and almost half of the females were gravid. Fruit from infested zones was routed to sterilization plants before shipment. Although the fruit shows some signs of freeze damage, there was no indication that the sterilization treatment accentuated this. Sterilized fruit continues to arrive in the terminal markets showing little or no decay. Heavy rains in the latter half of March greatly benefited the entire area and caused one of the heaviest citrus blooms on record.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Chemical constituents of green corn tissue affect survival and growth of corn borer larvae.--G. T. Bottger, Toledo, Ohio, reports that laboratory tests with green corn leaf and internode tissue indicate that survival and weights of European corn borer larvae are affected by differences in percentages of moisture, sucrose, reducing sugars, and protein contained in food media. Although larval survivals and weights can be associated definitely with both chemical factors and different strains of corn, it is apparent that differences in chemical factors large enough to affect biological differences in test larvae are not peculiar to any particular strain. Such factors as sterility, portion of the plant tested, and stage of maturity apparently exert far greater effects on the chemistry of corn-plant tissue and development of larvae reared thereon than can be accounted for on the basis of strain influence alone. Differences in average weights of test larvae nourished on internode tissue from the resistant strain R4 X Hy and the susceptible strain A X Tr, when both were manipulated to effect high sugar concentrations, indicate the influences of additional factors, possibly of a physical nature, which in R4 X Hy tissue interfere with larval feeding or possibly subsequent digestion and assimilation of the tissue by the insect. Determinations of pH, by the electrometric method, of various kinds of food media and blood from both single- and multiple-generation larvae, indicate that the more favorable foods are less acid than are the less favorable ones, and that the acidity of green corn and beans is increased appreciably after 48 hours exposure to warm humid conditions, whereas that of green peas is not, and that the pH readings of larval blood varies more in accordance with food and age influences than with the generation character of the larvae under observation. Synthetic feeding media formulated for laboratory nutrition studies apparently meet the requirements of larvae in the early instars much better than in the later instars.

New insecticide materials tested against corn borer larvae.--D. D. Questel, Toledo, reports that of 54 new materials tested in the laboratory against newly hatched larvae of the European corn borer, E-1419 shows promise enough to warrant field tests against the corn borer if the material is available in sufficient quantity. In the laboratory tests this material caused mortalities of 100, 98, and 99 percent when tested at rates of 4 pounds, 2 pounds, and 1 pound, respectively, per 100 gallons of water.

Damage by European corn borer in 1939.--A. M. Vance, Toledo, submits estimates of damage by the European corn borer in 1939, as follows:

Area	Field corn	Sweet corn	Total
	Dollars	Dollars	Dollars
Lake States----------	1,582,292	354,328	1,936,620
Eastern States[1] -----	264,043	1,776,463	2,040,506
Total-------------	1,846,335	2,130,791	3,977,126

[1] Includes 19 counties in eastern New York and 15 counties in northeastern Pennsylvania.

Field-corn resistance to European corn borer.--L. H. Patch, Toledo, reports that in 1939 the collection of data to determine definitely the status of 16 inbred lines respecting their reaction to corn borer survival was completed. In addition, the status of another lot of inbreds has been indicated, although less conclusively. All lines have been tested as inbreds in comparison with known susceptible and resistant inbreds and in single-cross combination in comparison with the same known susceptible and resistant inbreds crossed on common parents. Results from the two methods of testing have been consistent without exception, showing that factors for borer resistance are inherited. Inbreds Ill. R4, Wis. CC5, Ia. L317, Mich. 77, and Mich. 106 have shown resistance to borer survival; inbreds Ind. TR, Ill. Hy, Ill. L, Ill. A48, Ia. I 205, Wis. CC1, and B.P.I. 540 have shown partial borer resistance; whereas inbreds Ill. A, Ind. WF9, Ill. 90, and U.S. 187-2 have shown marked susceptibility. These inbreds were tested in different combinations in a test of single crosses in 1939. Four single-cross hybrids each with 2 resistant inbreds in their pedigree, averaged 40 percent less than the number of borers predicted for strains with their dates of silking. Ten single crosses made up of a resistant and a partially resistant inbred as parents averaged 16 percent less than the predicted. Four hybrids with 2 partially resistant inbreds as parents averaged 1 percent more than the predicted. Eight hybrids with 1 resistant and 1 susceptible inbred as parents averaged 6 percent more than the predicted. Seven hybrids with 1 partially resistant inbred and 1 susceptible inbred as parents averaged 32 percent more than the predicted. Three hybrids with 2 susceptible inbreds as parents averaged 57 percent more than the predicted. Data collected from double-cross hybrids during 6 seasons were grouped according to the inbreds entering into the pedigrees. Two hybrids with 3 resistant and 1 partially resistant inbreds in the pedigrees averaged 42 percent less than the predicted numbers of borers. Thirteen hybrids with either 2 resistant and 2 partially resistant inbreds or 1 resistant and 3 partially resistant inbreds in their pedigrees averaged 18 percent less than the predicted. Seven hybrids with 2 resistant, 1 partially resistant, and 1 susceptible inbred in their pedigrees averaged 4 percent more than the predicted. Fourteen hybrids with either 1 resistant, 2 partially resistant, and 1 susceptible inbred, or 1 resistant, 1 partially resistant, and 2 susceptible inbreds in their pedigrees averaged 8 percent more than the predicted numbers of borers. The data show clearly the cumulative effect of multiple factors in producing borer resistance in corn. Practically, the avoidance by the corn breeder of susceptible inbreds in producing commercial hybrids is indicated.

Interrelation of factors affecting control of European corn borer.--According to C. A. Crooks, Toledo, the spring debris survey conducted in the 52 unit areas that contained corn in the fall survey of 1938 showed a reduction of 93.42 percent of the host-plant material (corn) and 96.94 percent of the borer population. The residual host-plant material in the 294 unit areas averaged 5.09 linear feet and 0.16 borer per square rod. Two groups of follow-up crops were established to determine the effect of their cultural practices on the residual populations. In group 1 (the cultivated crops--corn and truck crops) extensive cultivation reduced the number of linear feet of corn from fall to spring 95.50 percent and the borer population 99.33 percent; group 2 (noncultivated crops--small grains) showed a reduction of 90.90 percent of linear feet of corn and 93.78 percent of the borer population. The seasonal development of the borer was several days later in all stages in 1939 than in 1938. More favorable host-plant conditions, as measured by height of corn at peak of oviposition, contributed to a more general distribution of oviposition throughout the area, although considerably fewer eggs were laid in 1939 than in 1938. A higher percentage of the eggs hatched in

1939, owing to less predation and other reduction factors. More favorable conditions for larval establishment and survival resulted in a survival of 19.67 percent in 1939, as compared to 8.34 percent in 1938. The fall population and crop survey indicated little change in the percentages of crops grown in the area, with a total of 51 unit areas containing corn, as compared to 52 found in 1938. The 294 unit areas averaged 82.50 linear feet of corn and 7.95 borers per square rod in 1939, as compared to 77.26 linear feet of corn and 5.59 borers in 1938. No significant differences could be shown between these populations. From a total of 36 random sections, 3.4 percent of the larvae were parasitized, as compared to 12.4 percent in 1938 from 51 sections. However, a change in collection procedure from polar coordinate to random-section design might account for some of the differences between the percentages of field parasitization in the 2 years. No meteorological records were compared except rainfall, which showed in both years less rainfall for the season in areas adjacent to Lake Erie than in those a few miles inland.

Differentiation between one- and multiple-generation strains of corn borer.--K. D. Arbuthnot, New Haven, Conn., states that apparently a homozygous single-generation strain of the European borer has been isolated from laboratory rearings, whereas rearings of successive generations of multiple strain have been accomplished only with considerable difficulty. All multiple-strain lines have been lost after three or four successive generations, owing to failure to obtain mated pairs, nonproduction of eggs by mated moths, or to all of the eggs produced being infertile. The multiple-strain segregates from Toledo field stock have shown a general decrease in rate of production and fertility after the second generation. A rapid decline in productivity and fertility was apparent in the multiple strain (New Haven) material. The percentage of egg hatching in each successive generation decreased in all material reared in 1939. Survival of progeny was low in all material reared, being lower in the single-strain and multiple-strain segregates than in the multiple strain.

Differences in rate of growth of one- and multiple-generation strains of European corn borer.--Mr. Arbuthnot also states that the single- and multiple-generation strains of the European corn borer, which have been under observation in laboratory rearings, have different rates of growth, owing to inherent differences in the two strains. The population present in the field in the vicinity of New Haven contains a strain homozygous for multipleness. The population in the field in the vicinity of Toledo contains a strain of single-generation corn borers which, when isolated, has an inherently slower growth rate than the New Haven multiple-generation strain.

Interrelation of factors affecting corn borer abundance at Onley, Va.--D. W. Jones, Onancock, Va., says that in the study area at Onley, utilized for measurements of the various factors contributing to fluctuations in populations of the European corn borer, 145 observation points in the total of 400 sections included in the 100-square-mile area fell on cultivated land. In this area pupation of overwintering borers occurs the latter part of March or early in April, subsequent oviposition taking place during the first half of May. Oviposition for the second and third generation takes place during the latter part of June and the first part of August, respectively. Borer populations in the area are mostly restricted to corn and potatoes, the latter crop supporting the first generation and the remaining two generations developing on corn. Weeds are negligible as a host-plant factor in this area.

Parasitization of the borers overwintering in 1938-39 averaged 9 percent, all being parasitized by *Lydella grisescens* R. D. Parasitization of first-generation eggs averaged 2.7 percent, second generation 7.7 percent, and third generation 0.3 percent, all by *Trichogramma*. Egg predation averaged 23 percent on the second generation and 10 percent on the third, mostly by ladybird adults and larvae. No satisfactory measurement of crop condition of potatoes associated with time of borer infestation was devised. Early or forward corn had passed its attractive stage of development at the time of third-generation oviposition, these moths selecting late or potato corn on which to deposit their eggs. Larval survivals averaged 8.07, 6.33, and 23.49 percent for the 3 respective generations. The number of borers surviving averaged 0.45 ± 0.093 and 1.74 ± 0.359 per square rod for the first and third generations, respectively, the means and the difference between them all being highly significant. The borer populations in debris in the spring averaged 0.19 borer per square rod.

Interrelation of factors affecting borer abundance in eastern Massachusetts.--According to E. W. Beck, Waltham, Mass., the spring debris survey conducted in the 29 unit areas that contained corn in the fall survey of 1938 showed a reduction of 91.48 percent in host-plant material and 95.25 percent in borer population. The residual host-plant material in the 289 unit areas averaged 0.605 linear foot of corn and 0.24 borer per square rod. Seasonal development began on May 8, with pupation of the overwintering larvae, emergence on May 29, and oviposition on June 3. Midoviposition occurred on June 22 and egg laying was completed by July 13. Of a total mortality of 73.44 percent from eggs to mature larvae, 23.06 percent occurred in the egg stage, the remaining 50.38 percent being due to reduction factors operating on the larvae. The total survival of first-generation larvae was 26.56 percent. Second-generation oviposition began on August 1, reached 50 percent on August 13 and 14, and was 100 percent by September 5. Of a total mortality of 85 percent from eggs to mature borers, 25.27 percent occurred in the egg stage and the remaining 59.73 percent in the larvae. Total survival of the second-generation larvae was 15 percent. The summer population survey averaged 9.66 borers per square rod. The fall population survey averaged 32.19 borers per square rod and 40.17 linear feet of corn, as compared to 13.11 borers per square rod and 18.35 linear feet of corn in 1938. No significant differences were found between the populations for the fall surveys in 1938 and 1939. Crop-condition and plant-maturation indices were earlier in 1939 for the first generation, with corn 3.5 inches taller at the peak of oviposition and pollen shedding and silking from 3 to 4 days earlier than in 1938. Second-generation indices were about the same as in 1938. Parasitization of the first-generation larvae was 19.08 percent, as compared to 25.72 percent in 1938. Records of second-generation parasitization in 1939 are still incomplete. Lack of rainfall and extremely warm weather during the summer months caused the corn to suffer from drought but no effect on the borer is apparent.

Nozzle arrangements for dusters and sprayers.--C. H. Batchelder, New Haven, states that comparison of the performance of two types of nozzle arrangements tested during this experiment indicate that the spray or dust discharge of nozzles on mechanically operated equipment was most effective when it was directed specifically at the points of most frequent borer entrance into the plant. Reduction of the number of borers in the plant and the protection of ears from infestation was accomplished most satisfactorily with nozzles directed laterally at the level of developing ears so as to leave a band of insecticide deposit on each side of the plants in the row. Incidentally, application at this level also provided increased protection for parts at lower levels of the plant. The borer reduction and yield increase obtained when nozzles were attached to the booms of mechanically operated implements closely approximated the effectiveness of hand-directed nozzle equipment with which very precise spot applications can be made. This would indicate that hand application had been duplicated mechanically with this nozzle arrangement. The performance of the overhead nozzle positions designed for general coverage indicates that general coverage is not so effective as spot application, which leaves greater quantities of insecticidal residues at specific points on the plant where larvae became established. The overhead method of distributing insecticides failed to deposit sufficient residues on or near the ears because of the "umbrella effect" of overhanging leaf blades. The results of these experiments show that motor-operated dusters and sprayers equipped with nozzle booms will provide more satisfactory performance when the arrangement of distributor tubes is adjustable and provides for lateral discharge at ear-level height.

Recovery of Inareolata punctoria Roman.--C. A. Clark, of the Moorestown, N. J., corn borer laboratory, reports that Inareolata punctoria Roman, an introduced ichneumonid parasite of European corn borer larvae, has been recovered from host collections made in Burlington County, N. J. The egg-larval parasite Chelonus annulipes Wesm. has been recovered for the first time in Connecticut following releases made in the spring of 1939 in the Connecticut River Valley.

FOREST INSECT INVESTIGATIONS

Furniss transferred to Fort Collins.--R. L. Furniss, formerly of the Portland laboratory, was transferred effective April 1 to take charge of the forest-insect laboratory at Fort Collins, Colo. During the 5 years of Furniss' assignment in the Pacific Northwest he completed a number of important studies, particularly a study of the hemlock sawfly (Neodiprion tsugae Midd.) and its parasites, the progress of insect damage in fire-killed Douglas fir, biology of the Douglas fir weevil (Cylindrocopturus longulus Lec.), a study of control methods for carpenter ants, and other general problems of the Douglas fir region.

Dry-site trees unfavorable for Dendroctonus development.--According to W. D. Bedard, of the Coeur d'Alene, Idaho, laboratory, those western white pine trees growing on dry sites, usually on high open ridges and other exposed areas, are unfavorable for the development of the mountain pine beetle. During the last 4 years, a total of 404 infested trees have been examined representing the 3 site conditions of wet, moist, and dry. Of these, 118 trees on wet sites produced an average of 28.0 new adult beetles per square foot, 118 trees on moist sites averaged 17.0 beetles per square foot, while 168 dry-site trees averaged only 8.5 beetles. An analysis of variance showed this difference between sites to be highly significant and more or less constant for different years. These findings indicate that broods in dry-site trees suffer a greater mortality than those in wet-site trees, probably because of the more rapid drying of the bark following the death of the tree.

Mortality of Scolytus multistriatus (Marsh.).--C. H. Hoffmann, of the Morristown, N. J., laboratory, has submitted a report concerning mortality of *S. multistriatus* larvae during the warmer months of the year. An elm tree cut on May 15, 1937, remained in the field until May 31. The stem was then cut into sections and placed in a rearing container in the laboratory yard. A total of 13,878 *S. multistriatus* adults issued during the summer. The sections were then barked and examined. It was estimated that if all the larvae had developed to the adult stage there would have been an emergence of 28,734 beetles. The data thus indicate that the larvae suffered a mortality of 52 percent. Previous studies had indicated, on the other hand, that mortality during the colder months of the year amounted to about 88 percent for this species.

Relation between North American and European species of dipterous parasites.--W. F. Sellers, New Haven, Conn., has been working on a revision of the North American parasitic two-winged flies belonging to *Zenillia* and allied genera. In many European and North American species which have been considered in the past by specialists to be Holarctic in their distribution and morphologically inseparable, there have been discovered in this study small differences that serve to keep their identities separate. This indicates a common origin of species that have been separated by geographical barriers for a sufficient length of time to be differentiated by small morphological characters, differences in biology, and in their host preferences. These individual peculiarities are maintained even when the forms are brought together in the same habitat either by artificial or other means of dissemination. While working on this revision, it has become increasingly evident that the only European species of tachinids that occur in North America are those which have been imported or have originally accompanied their hosts here. The taxonomy of six examples of the above-described phenomenon has been considered in the present study. *Carcelia laxifrons* Villeneuve, an introduced and established parasite of the brown-tail moth, is distinct from what was previously considered to be its American counterpart, an unnamed species which is parasitic on the Eastern tent and forest tent caterpillars. *Carcelia reclinata* Aldrich and Webber, a parasite of the North American tiger moths, is similar to *Carcelia cheloniae* Rondani, which is parasitic on the European tiger moths. *C. cheloniae* was the name erroneously used for *C. laxifrons* when it was introduced into the United States; *C. cheloniae* does not occur in North America. *Phryxe vulgaris* Fallen, a parasite of the imported cabbage worm, is distinct from the American *Phryxe pecosensis* Townsend, with which species it was once confused. *P. pecosensis* does not attack the cabbage worm. If *P. vulgaris* was not accidentally introduced, it accompanied the imported cabbage worm in its spread into North America. Townsend has expressed the opinion that *P. vulgaris* does not occur in North America and that its American equivalent is *Phryxe hirsuta* Osten Sacken. *P. vulgaris* is a synonym for *P. hirsuta*. *Aplomya mitis* Meigen, an introduced parasite of the European corn borer, has been confused with *Aplomya caesar* Aldrich, which is parasitic on the spruce budworm and other leaf rollers of the genus *Archips*. A variety of *A. caesar* is parasitic on the American *Pyraustas*, including the European corn borer, but it is distinct from *A. mitis*. The American equivalent of *Aplomya confinis* Fallen, a European species that does not occur in North America, is *Aplomya theclarum* Scudder, which is parasitic on the lycaenids, or gossamer-winged butterflies. *Aplomya affinis* of Aldrich and Webber (not Fallen) is an unnamed American species of this genus which is parasitic on the tiger moths. *Aplomya affinis*

Fallen is a European species that apparently does not occur in North America.

Injury to birch by roundheaded borer.--H. J. MacAloney, Milwaukee, Wis., received a request on March 11 for information concerning an insect larva taken from a piece of birch in the seat of a chair at Rockford, Ill. The chair has been in this home for 18 years, has never been repaired, and has never been out of doors so that oviposition could occur.. The gallery is about 3 inches long. The species was identified by F. C. Craighead as Eburia quadrigeminata Say. Previous records give a life cycle of 3 to 20 years.

Ash and oak borers cause annoyance.--One of the most frequent causes of complaint by home owners in the Pacific Northwest, according to F. P. Keen, of the Portland, Oreg., forest-insect laboratory, is the emergence of large numbers of cerambycid adults from oak and ash firewood stored in their basements. With the first warm days late in winter or early in spring, adults of Neoclytus conjunctus Lec. and Xylotrechus nauticus Mann. begin to emerge, and for a few weeks complaints and requests for control measures are frequently received. This year the first emergence was noted on January 15 and 13 calls were received between that date and March 21. No control measures appear to be practical, but the trouble might be remedied by some change in the time of cutting and storing firewood in the field.

Matsucoccus scale weakens mature ponderosa pines in California.--Heavy infestations of Matsucoccus bisetosus Morrison have been observed on middle-aged to mature Pinus ponderosa trees near Middletown, Lake County, Calif., by H. L. McKenzie during the summer of 1939. Considerable top-killing, excessive branch-flagging, and a reduction in needle complement were evident, apparently as a result of scale feeding on these pines. During the fall of 1939 many of the scale-infested trees were subsequently attacked by the bark beetles Ips confusus Lec. and Dendroctonus brevicomis Lec. It is suspected that this same phenomenon exists in pine stands elsewhere in California. The Berkeley laboratory plans to initiate studies along this line in the future.

Mites attack artificially propagated predator larvae.--G. R. Struble, Berkeley, Calif., found that larvae of the green trogositid, Trogosita virescens F., left to hibernate in vials during the winter months at the Miami, Fla., sublaboratory were invaded by the mite Pediculoides ventricosus (Newport) which caused considerable mortality. Of 350 larvae set up, 40 percent died by March 19, 1940. The presence of mites actively feeding on several of the larvae strongly indicated the cause of death. This is a new obstacle which has developed, indicating the necessity for changes in the technique of artificial rearing of predators. Presumably the mite contamination was introduced by Dendroctonus monticolae Hopk. host larvae fed to each predator larva.

Mountain pine beetle infestation spotted by airplane.--Airplane spotting, supplemental to regular ground-crew marking of infested sugar and ponderosa pines over mountainous terrain, indicates surprising accuracy with regard to sizing up an infestation, according to G. R. Struble, of the Berkeley laboratory. A flight made recently by the Forest Service in connection with the Oak Flat Insect Control Project on the Sierra National Forest, in which counts of all red-top and fading trees were made, clearly indicated the extent and centers of heaviest infestation, and checked well with an accurate ground-crew survey of the area. The control area, composed of 16 sections of rough mountainous country, was stripped 4 times during the flight. The Oak Flat Project was financed jointly by the United States Forest Service and the Southern California Edison Company. This project was stimulated by a growing insect hazard in this highly valuable virgin commercial timber area. A total of 164 trees, having a volume approximating 600,000 board feet, were treated by felling and burning. Single sugar pines having a volume of 25,000 feet were common. The project was carried on between March 4 and March 26.

Mountain pine beetle broods heavy in sugar pine.--Overwintering broods of D. monticolae in sugar pine at Oak Flat, on the Sierra National Forest, were again heavy this year, according to Mr. Struble. An examination of the infested length of 2 trees, felled by insect-control crews on March 21, indicated an average population approximating 200 larvae per square foot of inner bark. Predator larvae were few in number, represented by fully grown larvae of Medetera aldrichii Wheeler and first-stage larvae of Enoclerus sphegeus F. It is estimated that the control work by felling and burning on this area of 10,000 acres will destroy between 10 and 12 million larvae of D. monticolae.

JAPANESE BEETLE CONTROL

Nurserymen welcome lowering of temperature requirements for methyl bromide fumigation.--Authorization in B. E. P. Q. 499 (Supplement No. 1, revised) on March 22 of a reduction below the previous minimum of 63° F. in the requirements for methyl bromide fumigation as a condition for Japanese beetle certification was very acceptable to the nurserymen now utilizing this method. The treatment schedules were widened to permit, in addition to the previous exposure of $2\frac{1}{2}$ hours at 63°, exposures of 4 hours at 54°, and $4\frac{1}{2}$ hours at 50°. The dosage of $2\frac{1}{2}$ pounds of methyl bromide per 1,000 cubic feet was unchanged. This longer exposure period has resulted in overtime work for some of the inspection force. In the Philadelphia area one nurseryman operating a fumigation chamber is located 100 miles from the district office. The return trip plus the $4\frac{1}{2}$-hour treating period occupies 10 hours or more. In the New Jersey area activities of another nurseryman have made it necessary for an inspector to be on the job at 7 a.m. in order that the fumigation box may be operated continuously during the day. A northern New Jersey nursery is completing a new fumigation box large enough to hold the equivalent of a carload of stock.

Japanese beetle trap supply being replenished.--Manufacture of 50,000 scouting traps to augment the Division's supply for use this summer was started in February and continued during the month of March. These traps are being stamped and formed from yellow-coated black iron sheets. The sheets are sufficiently large to permit the shearing off of a small strip that is then rolled and used as a shield around the glass bait bottle. Tests by the Division of Insecticide Investigations at the Moorestown, N. J., laboratory showed that the action of light on bait is detrimental, and the use of such a shield was recommended. Including the Division's reserve supply of scouting traps, there will be available a total of approximately 80,000 traps for the 1940 trapping program. At the same time the traps were being manufactured, 80,000 1-ounce bottles were filled with liquid bait and wicks were cut and stapled. Trapping is scheduled to start in Miami, Fla., on April 15, following which additional trap routes will be established by the same supervisor as he works his way north. Local trap inspectors will be employed to cover the routes as they are set up.

District and suboffices moved.--Arrangements were completed during March for the transfer on April 23 of the Richmond, Va., district Japanese beetle office from room 1005 in the Grace-American Building to space in the building already occupied by the tobacco-beetle project of the Division of Truck Crop and Garden Insect Investigations, at 17 North Boulevard. The former Japanese beetle inspection office at Twelfth Street and Constitution Avenue, Washington, D. C., was discontinued at the end of March. To replace this an inspection office has been established at the Experiment Station of the Bureau of Plant Industry at Glenn Dale, Md. W. N. Dobbs, formerly in charge of the District of Columbia inspection office, has been transferred to trap-scouting supervision in the Southern States. W. H. DeWaters is the inspector assigned to the new Glenn Dale suboffice.

Japanese beetle inspections brisk at Easter.--Several factors were reported by florists in the Japanese beetle regulated area as contributing to the disposal of large quantities of florists' stock during the Easter season, much of it from certified greenhouses. The southern freeze eliminated most of the outdoor-grown plant material usually sold in the north at Easter, and the freezing weather prevented the customary street vendors from setting up their stands or even occupying unheated stores. Although some of the florists were left with a surplus on hand after Easter, most of the classified florists for whom plants were certified reported a complete sell-out at good prices, despite the early and unseasonable Easter.

Soil treatment for Japanese beetle at Winchester, Va.--Application of lead arsenate to infested premises on which nine Japanese beetles were trapped during the summer of 1939 began on March 11 and was completed on April 3. A total of 29.5 acres was treated. The lead arsenate was purchased by the county of Frederick and the city of Winchester. Labor was furnished jointly by the fruit growers and the city. The State furnished a supervisor to get the necessary clearances from the property owners and this Division supplied the spray truck, operators, and a man to supervise the operation of the truck.

Japanese beetle inspection force increased.--A few additional inspectors were hired in March to take care of increasing demands for the inspection and certification of greenhouse and nursery stock in the southern part of the Japanese beetle regulated area. An extra inspector was employed for assignment during the remainder of the spring shipping season at one of the larger Delaware nurseries. Another of the recently employed inspectors was stationed from March 11 to 23 at a large greenhouse establishment in the Philadelphia area to handle the many shipments of certified Easter plants.

Increased domestic demand for New Jersey peat.--Peat dealers in New Jersey whose products are eligible for certification have reported that, because of the difficulty in obtaining peat from foreign countries, there is an indication that there will be considerable demand for the local product.

Certain substitutes have already been mentioned for possible use in place of foreign packing materials. Two of these are already in use, in the form of shredded sugarcane, and a mixture of ground corncobs and oat straw.

Ice storm increases potential elm bark-beetle material.--An ice storm on the night of March 3 and morning of March 4 caused widespread damage to elm trees in large sections of the Dutch elm disease infected area. In some sections this damage approached or exceeded the damage done by the hurricane of September 1938, particularly insofar as the production of elm wood subject to elm bark beetle attack is concerned. The principal damage by the hurricane was the blowing down of entire trees. The recent ice formation on the trees broke off large branches and left many hangers that must be removed before the next emergence of elm bark beetles. Ice on the trees was so thick that in sections severely affected there is scarcely an elm in which there are not one or more hangers. Additional work caused by the ice storm made it necessary to deviate from the regular work assignments to take care of the emergency situation. The Connecticut State Leader reported that the storm caused more potential beetle material than existed in the work locations before elm-sanitation work began in these areas. In the town of Ridgefield, Conn., a survey indicated that 100 men may be required for a year to remove and dispose of damaged elm wood. Much of this material along highways was removed by the end of the month. The Connecticut State Highway Department allotted $15,000 in Norwalk, $15,000 in Bridgeport, and $6,000 in Danbury for repair of highway trees broken by the storm. The Highway Department also removed dangerous broken material in other towns.

Hurricane lumber certified in quantities.--Since early last fall the inspector in the Manchester, Conn., district has inspected an unusually large number of ash logs for gypsy moth. In recent years it has been increasingly difficult to locate enough ash to supply demand. A considerable amount of ash timber has been conserved in the White Mountain National Forest; however, the hurricane of September 1938 felled many of these trees and made available ash lumber that would not otherwise have been cut. Many lumber operations have been in progress in this restricted district and many thousand feet of ash have been removed. In the White River Junction, Vt., district the inspector reports that the Northeastern Timber Salvage Association has started shipping peeled pulpwood from Randolph, Vt., to a paper mill at Shelden Springs, Vt. This inspector has also examined one carload of straight-edge lumber for exportation by way of Boston. He reports that thousands of cords of wood are piled at various railroad yards and sidings, some of which will be shipped to nonregulated areas. Lumber shipments from several other areas were reported as delayed by heavy snows and spring thaws that make many of the secondary highways impassable. The inspector at Westerly, R. I., examined for gypsy moth infestation a quantity of cross and switch ties cut from hurricane lumber and sold to one of the New England railroads. Considerable time was spent in this inspection because the ties were stored in small lots at scattered locations. The inspector at Keene, N. H., made his first inspection of government-owned lumber, consisting of two carloads, in March.

Gypsy moth eggs scrambled by grinding machine.--Tests run at one of the New Hampshire sawmills have demonstrated that the process employed there is adequate to destroy any gypsy moth eggs that may be on material passing through their grinding machine. On the basis of these tests, sawdust produced by this firm is granted certification for shipment to points outside the gypsy moth regulated area. Early in January several hundred gypsy moth egg clusters were mixed with shavings and run through the grinder that converts the shavings into sawdust. The resulting sawdust was collected and taken to the Waltham, Mass., field headquarters where several hundred apparently uninjured eggs were removed by screening and hand picking. These and an equal number of eggs that had not been run through the grinder were placed in similar containers and kept at room temperature. Within 30 days emergence from the check eggs began and by the end of 70 days most of the check eggs had completed hatching. There had been no emergence from eggs that had passed through the grinder. Recently some 200 of the eggs from the sawdust were examined under a microscope. Of the lot that appeared normal, two-thirds were actually cracked or partially collapsed, apparently by mechanical injuries received in the grinder, and the remaining third were intact but appeared to contain no living larvae. Most of the latter eggs were transparent, with the exception of a small dark splotch on one side. When these were broken open and the interiors examined, it was found that they had dried out and that the dark splotch was the contents that had apparently settled at the bottom. Other eggs were only semitransparent. When these were broken open the insides of the shells appeared to have been smeared with some varicolored material, indicating that the eggs had been literally scrambled.

Usual additions to New England gypsy moth inspection force not needed.--No temporary men were employed in the inspection of nursery stock during March in the gypsy moth infested area of New England. Deep frost in all sections prevented digging, even in the Newport, R. I., district, where it is usually possible to start digging late in February or early in March. With an unusual amount of frost still in the ground at the end of March many of the nurserymen feared cancelation of orders, since the late digging season shortens the period of time in which plantings can be made. There was at least 4 feet of frost in the ground in western Maine at the end of the month. The only movement of certified nursery stock in quantity from the New England area consisted of stock previously inspected and stored in warehouses. The district inspector at Westfield, Mass., certified for movement from the regulated area or to other classified dealers one carload, four truckloads, and three large freight shipments of such stored material. In the Keene, N. H., district heavy snow in the woods held up pulpwood shipments, while at Stafford, Conn., the snow was so deep that ties were hauled from a lumber yard to the highway by tractor and sled. Granite sheds in the Quincy, Mass., district were just resuming their operations at the end of the month.

Gypsy moth infestations destroyed in certified products.--Car stakes, lumber, cut hemlock, mixed greens, railroad ties, buoys, and cedar poles comprised the articles from which 25 gypsy moth egg clusters were removed in the course of the month's inspection. Most of the finds were of single egg masses.

LIBRARY
STATE PLANT BOARD

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Heavy snow and rain make gypsy moth work difficult.--The first week in March provided the most unfavorable conditions that have been encountered during the winter throughout the entire region where gypsy moth work is conducted. A heavy fall of wet snow forced the temporary suspension of work in Vermont, while rain and snow fell intermittently in Massachusetts and froze on the higher elevations. In Connecticut and Pennsylvania rain and sleet formed a heavy coating of ice on trees and highways, breaking many branches and making automobile travel extremely hazardous. Very little gypsy moth work could be done during the first part of the week in any section, and in some sections of Vermont no work was possible during the entire week. Measurements showed that the snow averaged 5 feet in depth at high altitudes in the mountainous region of northern Vermont, but only about 10 inches at lower elevations. In Berkshire County, Mass., the depth of snow near the summits of the Housatonic and Taconic Ranges averaged up to 4 feet in the forests. The snow was well packed and provided excellent snowshoeing for the gypsy moth workers, although ledgy slopes rapidly became hazardous to traverse because of ice formations resulting from thawing temperatures at midday followed by freezing nights. Many roads were blocked by the snow and others became extremely icy and slippery, which interfered considerably with the transportation of gypsy moth workers. Another snowstorm and heavy rains toward the end of the week caused further interruption of the work in many regions. While the streams rose rapidly and were somewhat choked with ice, there appeared to be no immediate danger of serious flood conditions in the New England area.

Hunger drives wild birds to feed near farm buildings.--The gypsy moth supervisors report that hunger has driven game birds, particularly pheasants, to seek food around farm buildings, as their natural food was buried deeply beneath the snow. The wild birds were frequently observed feeding with the poultry in the farmyards.

No gypsy moth infestation found in previously infested town.--The entire township of Essex, Chittenden County, Vt., was carefully scouted during last December and until March 19. No indication of a living infestation was found, despite the fact that this town was infested in 1936. Intensive treatment work done at that time included the thinning of approximately 40 acres of ledgy, rock-strewn woodland in which oaks and other favored food plants of the gypsy moth predominated. This was followed in the spring of 1936 by the application of burlap bands, which were methodically patrolled throughout the larval season. During the month of June, in the same year, about 85 acres was thoroughly sprayed with lead arsenate. No infestation has been found since that time in Essex.

Several small gypsy moth infestations located in Vermont.--The scouting of Brandon Township, Rutland County, Vt., was finished late in March, the work resulting in the discovery of five small gypsy moth infestations. The treatment work at some of these colonies is still incomplete because of the presence of deep snow. It is expected, however, that this work will be finished early in April, as well as the work in Hinesburg, Chittenden County, where tree growth in several large bogs and swamps was examined under ideal conditions earlier in the winter, when all swampy areas were solidly frozen over long before the heavy snowfalls occurred. Three additional infestations were located in Middlebury, Addison County, during the latter part of March, but it will be impossible to determine accurately the extent of any of them until after the snow melts and permits the careful examination of deadwood and other ground debris. Two additional infestations were found during the first part of March in Bristol, Addison County, and close scouting in this town will not be completed until the snow has melted. In general, chopping work at the various infestations progressed satisfactorily during the month, despite transportation difficulties and the temporary suspension of work in some sections because of severe weather. At infestations where the snow was exceptionally deep most of the chopping was confined to removal of the larger defective trees.

Deep snow reduces production of maple sugar and sirup.--Considerable maple sirup is produced annually throughout the State of Vermont and in Berkshire County, Mass. Although some snow during the sugaring period is desirable, there has been so much of it in the woods since the middle of February that many farmers have postponed their sugaring work because of the difficulty of breaking roads through the forests so that the sap can be gathered. The sugar season is rapidly drawing to a close, and it is now predicted that less maple sugar and sirup will be produced this year than usual.

Broken egg clusters prevalent where ice storms were frequent.--The percentage of broken gypsy moth egg clusters found increases as the season advances. This condition, though not unusual, seems to be particularly prevalent this winter in the Berkshire region of Massachusetts and also in northwestern Connecticut, where ice storms have occurred frequently. As high as 75 percent of the egg clusters were recently found to be broken in some localities, and numerous cases were found where only the outlines of the egg clusters remained. As individual eggs and the broken parts of the egg clusters cannot all be found in the debris on the forest floor, additional measures for the eradication of the insect will be necessary at such locations.

Cleaning and thinning work resumed in Connecticut.--Treatment work at the gypsy moth infestation in Southbury, New Haven County, Conn., was temporarily suspended during the first part of March, as the deep snow interfered materially with the removal of worthless smaller trees and bushes. Later in the month work was resumed in this area, but at that time it consisted mainly in the removal of several very large defective trees. These trees were cut down and split to sizes that could be easily burned, as the property owner did not want the wood for fuel. At the end of the month it was possible to resume the work of removing the smaller growth, as the snow was melting rapidly. Progress at this infestation was necessarily slow during March. A small crew of men was engaged in climbing trees, aided by ropes, in the center of this infestation, to creosote gypsy moth egg clusters that could not be reached from the ground. Although these men originally knew nothing about climbing with ropes, they quickly became proficient in this branch of the work.

Map revision started in Connecticut by gypsy moth employees.--In Connecticut two experienced agents employed by this Bureau recently started revising township maps used in scouting work. Although most of the maps of towns in the barrier zone region of Vermont, Massachusetts, and Connecticut are prepared to a uniform scale and are reasonably accurate in most respects, some are still drawn to scales difficult to compute. Whenever available, data from United States Geological Survey maps are used, particularly the data pertaining to roads, trails, streams, ponds, and important elevations.

Dead chestnut trees prevalent in western Connecticut.--Chestnut originally comprised a substantial proportion of the forest stand in western Connecticut, as is evidenced by the large number of dead chestnut trees still standing in nearly every wood lot where gypsy moth thinning work is being conducted. Despite the fact that practically all of the chestnut trees have been dead for 15 or more years, as high as 50 percent of the deadwood which must be felled and destroyed at many of the infested locations in Connecticut is chestnut.

Timber cutting for mining industry leaves littered wood lots.--The coal mining industry in eastern Pennsylvania draws heavily on the forests over a wide area centering around the Wilkes-Barre-Pittston-Scranton area for mine props and laggings. As a result, thousands of acres of cut-over woodland are left which are covered with tangles of treetops left after timber suitable for the mines has been removed. These areas are exceedingly difficult to scout, and when gypsy moth infestations are found in such localities, a great deal of work is necessary to clear the wood lots of the dead treetops, which must be cut up, piled, and burned. Many of the infestations found in Pennsylvania this winter are situated in such areas, and an enormous amount of work has been required to clear away the deadwood and slash.

Gypsy moth infestation found in rubbish-littered yards.--Owing to severe weather conditions in Pennsylvania during the first week in March, gypsy moth work was largely confined to settlements in the Susquehanna River Valley, where the ice storms were less rigorous. In the course of scouting the district of Dunmore Borough in Scranton Township, Lackawanna County, an infestation of more than 200 gypsy moth egg clusters was found in the rubbish-littered yards of 2 adjoining properties where a large quantity of old lumber was piled. It was necessary to examine all of the rubbish and to repile the lumber in order to uncover and treat the hidden egg clusters.

Inspection of shipments in Pennsylvania quarantined area.--In the area of Pennsylvania quarantined on account of the gypsy moth, where eradication measures are in progress, it is of major importance that the reinfestation of cleared areas be prevented. For that reason, materials likely to contain gypsy moth egg clusters are prohibited from being moved from one part of the area to another section without inspection and certification. During 1 week in March, quarantine inspectors found 23 gypsy moth egg clusters on shipments of surface stone originating in Pittston Township, Luzerne County, and destined for a resurfacing project in the neighboring borough of Dupont. Dupont was generally infested by the gypsy moth several years ago, but it is now practically free of the insect. During the same period, several egg clusters were found on mine timbers originating in Plains Township, Luzerne County, and 5 additional egg clusters were found on firewood from the same wood lot and consigned to an address in Wilkes-Barre. All egg clusters were destroyed by creosoting before the shipments were allowed to proceed to their destination.

C. C. C. gypsy moth work reduced in March.--During the week ended March 2, the C. C. C. used 2,253 6-hour man-days on gypsy moth work under the supervision of this Bureau in the area east of the barrier zone. This amount gradually decreased to only 1,293 man-days near the end of the month. The decrease was largely due to the completion of an enrollment period at the end of March, when many enrollees left the camps because of the expiration of their time limit, and also to the abandonment of the camp in Greenfield, Mass., toward the end of the month. Several experienced enrollees from the Greenfield camp were transferred to the camp in Westfield, Mass., where their training will be of great assistance. The camp formerly located in Westfield was moved farther east in December 1938, and concentrated on fire-hazard-reduction work. This camp was recently returned to Westfield and has begun gypsy moth work in that vicinity. Many of the men now members of the camp have not had gypsy moth experience and must undergo necessary training before starting actual work in the field.

Results of C. C. C. gypsy moth scouting.--The scouting work so far done by the C. C. C. has shown a considerable spread of the gypsy moth in Massachusetts and Connecticut, with large and healthy but more or less scattered egg clusters. Extensive areas of severe infestation, such as were present in these States during the last few years, have not been discovered and the pockets of heavy infestation are much smaller; however, extremely heavy infestations have been found in Vermont, particularly in the towns of Westminster and Rockingham, and the scouts have also found scattered infestations, denser than usual, as far west as they have scouted in Grafton, Windham County. A crew from the State gypsy moth office has assisted in rapid scouting work north and east of the area treated in Granby, Conn., last summer, in order to determine the present condition of this region. Some pockets of heavy infestation were found, but this area is generally in much better condition than last year. This crew has also rapidly scouted an area of approximately 1,000 acres south of the Granby area, at Simsbury and Canton, in an attempt to locate favorable areas for autogiro spraying. No extremely heavy infestations were discovered, but areas were found where the infestation ranged from 100 to 500 egg clusters per acre, and a few plots were found with over 500 egg clusters to the acre. The crew is now doing intensive work in this region laying out plots of 100 acres each to be used for autogiro spraying next June. A suitable landing field for the autogiro located within a reasonable distance from the areas to be sprayed has not yet been discovered.

Orders issued by C. C. C. for spraying equipment and supplies.--Three high-powered spraying machines were ordered by the C. C. C. in March, two of them to be used for gypsy moth spraying in Connecticut and one in Massachusetts. Orders were also issued for 25 tons of lead arsenate for use in Connecticut and 7 tons for Massachusetts, together with an adequate amount of fish oil. As this spraying equipment may not be available for use during the approaching spraying season, arrangements have been made with this Bureau for the loan of sufficient spraying equipment to use the material ordered. The C. C. C. will furnish the labor required, in addition to the supplies, during the spraying season. The Connecticut State entomologist's office will aid in supervising the work in that State and will furnish trained men to operate the spraying machines and to handle the spray nozzles.

C. C. C. gypsy moth training fits men for outside specialized work.--A memorandum issued in March by the War Department notified C. C. C. camps in the First Corps area that a tree-expert company had a considerable number of openings for men who were accustomed to climbing trees by the use of ropes. Many men now in C. C. C. gypsy moth crews, as well as former members of the crews, have received this training, and some of these men have been offered the positions. An examination of the termination slips of C. C. C. enrollees on file at this office revealed that 134 enrollees who had been employed on gypsy moth work for at least 6 months had had rope-climbing training and were recommended by their foremen for this type of work. The names and addresses of these enrollees have been furnished to the tree-expert company.

PLANT DISEASE CONTROL

Barberry eradication.--When field activities of labor crews were closed for the season in October, George W. Eade, State leader of barberry eradication in South Dakota, devoted much of his time to the informational program. Through the cooperation of the county superintendent of schools in Clark County, arrangements were made to present illustrated talks in all rural schools in that county on the eradication of common barberry bushes for the control of stem rust. A total of 79 rural schools was visited and home-survey cards were left at each school to be returned when the children had inspected their home properties for barberry bushes. One of the principal objectives of this type of program is to locate planted bushes that may have been missed during the early part of the campaign. Upon completion of visits to all rural schools, contacts were made with all independent districts in the county where talks illustrated with lantern slides were given in all city schools of the county, as well as in rural consolidated districts. This resulted in an intensive informational program for the county since no schools were omitted. At the request of the instructors, illustrated talks have since been given to the Smith-Hughes agricultural classes at St. Lawrence and Miller in Hand County. Plans are being completed to carry on similar work in the C. C. C. camps operating in the State. Most of these camps are located within the Black Hills. This area was inspected by a farm-to-farm survey in the middle 1920's but has never been covered by an intensive survey. In Nebraska Marion E. Yount, leader of barberry-eradication work, reports that survey work was resumed on April 1. Two field supervisors and 29 laborers began work in York, Merrick, Wheeler, and Holt Counties. Wherever possible field crews will make use of data transferred from aerial photographs to soil-survey maps.

Nursery-inspection work in 1939.--During the 1939 season requests for nursery inspection, for the interstate movement of immune species of Berberis and Mahonia, were received from 46 nurserymen and 1 seedsman in the Eastern and Middle Western States. As a result of these requests, L. M. Ames inspected 13,633 acres of nursery stock from which 9,414 susceptible barberries were removed. Of these nurseries 44 were issued permits to ship barberries but 2 were unable to meet the requirements. While on his inspection trip, and in cooperation with State leaders of barberry eradication, approximately 3,800 susceptible barberries were removed from other nurseries and private homes, bringing the total number of susceptible barberries destroyed to 13,214.

Post-hurricane blister rust notes.--C. C. Perry, in charge of blister rus control work in Massachusetts, gives us some interesting notes on observations on the area devastated by the hurricane in September 1938, with particular reference to its effect on white pine. One of the natural inquiries following the devastation caused by the hurricane was speculation as to the degree to which the 1938 pine seed crop would restock the areas. It was reasonable to anticipate that with the disturbance of the soil, due to the uprooting of so many trees, and from salvage and fire-hazard-reduction operations, successful regeneration would occur. Casual observations made by the blister rust district leaders and others, while not conclusive, seem to indicate that regeneration has not been satisfactory. While it is possible that seeds are still viable and seedlings may develop in 1940, the situation in general is rather disappointing. Observations by the United States Forest Service in the Hampden-Hampshire district revealed that in 45 quarter-acre plots, 11 showed no 1939 seedlings. In 28 plots there were from 1 to 50 seedlings per plot. In 4 plots there were from 51 to 100 seedlings per plot, and only 2 plots showed more than 100, with a maximum of 147. There is one reassuring sidelight on these particular studies, however, and that is that in most instances seed trees are still present in or near the areas and these may serve to restock the ground. Search for an explanation of the apparent failure of the 1938 pine-seed crop to restock these areas leads to the plausible conclusion that normal germination may have taken place, but that the extremely dry conditions during the summer were fatal to the young seedlings. No concerted effort has been made to determine the degree to which Ribes have regenerated on the hurricane areas, but casual observations do not indicate that any great amount has occurred. Mr. Clave, district leader in blister rust control work in Massachusetts, comments that during the Ribes-eradication season many blow-down areas were looked over to determine whether there had been any regeneration of Ribes. He reports that no seedlings were found. He did find one gooseberry bush in Charlton, Mass., which had increased in live stem by at least 200 percent during the 1939 growing season because the white pine which had shaded it was down. There have been a number of other instances where the growth of Ribes has been definitely stimulated by the removal of the overhead in the stand. Mr. Perry, who was particularly interested in the condition which prevailed in the white pine areas in the coastal towns in Bristol and Plymouth Counties where salt spray during the hurricane severely "burned" the crowns of the pines, made several trips to the affected areas and reports that apparently the damage, in general, was of a temporary nature, resulting in inferior growth during the 1939 growing season and possibly during 1940. Areas of blown-down timber hampered Ribes-eradication work; however, the extensive clean-up work by the United States Forest Service and allied interests made it possible to work many areas that otherwise would have been entirely impassable.

New England townships cooperate in blister rust control.--Reports from town meetings held in New England recently show that 41 townships in Maine appropriated $7,675 for cooperative blister rust control work. In addition, the town of Rumford, Maine, will expend an unknown amount for transportation. The amount appropriated in the State this year shows a slight increase over the 1939 cooperative funds. In New Hampshire 21 towns had appropriated $6,400 up to March 15. One town, not having appropriated funds since 1920, made available $400 which will be needed to begin reeradication work. Indications point to possibly larger appropriations this year than last.

Spread of blister rust.--Blister rust infection on white pine has been reported in two new locations in Michigan, namely, Alger and Delta Counties, at locations far removed from previous known infection. The infection in Alger County consisted of young cankers dating in origin from 1933 to 1936. Six cankers were noted in a small unprotected wood lot but, judging from the dense Ribes population, it is believed that several more cankers exist in the same area. One 1931 canker was noted in Delta County. These new infection centers extend the known range in counties in which blister rust on white pines had previously been reported. Blister rust infection was reported for the first time in Blackhawk County, Iowa. The disease was found on old Ribes nigrum leaves on which the blister rust had been present in 1939. Pine infections were found on February 29 in Highland County, Va., in the George Washington National Forest on Area 38-F, where 4 pines out of 50 examined were infected, and on March 11 on Area 23, where 37 out of 150 pines were infected. On March 13, in Page County, Va., 1 pine was found infected in Fall Hollow.

COTTON INSECT INVESTIGATIONS

Winter mortality of pink bollworm.--H. S. Cavitt and O. T. Robertson, Presidio, Tex., made examinations during the latter part of February and in March to determine the winter mortality of pink bollworm larvae overwintering in bolls on cotton plants and in bolls on the soil surface. These examinations showed that there was very little winter-kill in either of these environments. The mortality on the stalks was 12 percent and on the soil surface 2.8 percent, averaging 7.4 percent for the two environments. Similar examinations in the two preceding winters, 1937-38 and 1938-39, showed an average mortality of 34 percent for the two environments each year. There was apparently no relationship between the worm mortality in the bolls and the number of hours below freezing during the 3 years. The winter of 1937-38 was mild with a minimum of 19° F. and a total of 134 hours below freezing, whereas the winter of 1938-39 was cold, with a minimum of 18° and a total of 402 hours below freezing, yet the worm mortality was the same, 34 percent for both winters. Although the winter of 1939-40 was not unusually cold (minimum temperature 16° F. and a total of 341 hours below freezing), it was exceptional in that a 2-inch snowfall was recorded and during one period the temperature did not go above freezing for 40 consecutive hours. The examinations indicated, however, that the snow and the prolonged cold had very little effect on the worms in the bolls. In addition to the examinations to determine the winter mortality of the larvae overwintering in bolls, observations were also made this year to determine the winter mortality of the larvae overwintering in the debris on the surface of the soil and in the soil. These observations indicated that there was a much higher mortality in the surface debris and soil than in the bolls. At the beginning of the winter, surface debris collected from 75 square yards in three unplowed fields showed an average of 0.84 larva per square yard, whereas 150 square yards from the same fields in the spring showed an average of 0.24 larva per square yard, or a winter mortality of 71 percent. The examination of 25 square yards of soil in the same three fields during the early part of December showed an average of 7.3 larvae per square yard and the examination of 45 square yards in the spring showed an average of 2.8 larvae per square yard, or a winter mortality of 61 percent. Most of the worms in the surface debris and soil are in cocoons and are not as well protected as the worms in bolls. Soil examinations in another field that had been disked and irrigated in January showed a mortality of 84 percent, or 23 percent more than in the unplowed field, despite the fact that the disking and plowing was done too late in the season to cause the maximum increase in mortality.

Pink bollworm survival in New Mexico.--A pink bollworm survival record of considerable interest was made at Malaga, Eddy County, about 15 miles from Carlsbad, N. Mex. This is the first time hibernation studies have been conducted in this area, as in previous years the infestation has been too low to afford suitable material. Last fall a small field of cotton was found that was rather heavily infested. Bolls from this field were placed in hibernation cages in November and examinations made during the last week of March showed a survival of 3 worms per 100 bolls that had been lightly buried and of 11 worms per 100 bolls left on the soil surface over winter. Soil examinations also showed a carry-over of 0.6 larva per square yard in this field. The recovery of live larvae from each of the 3 environments definitely established the fact, for the first time, that the pink bollworm survived the winter in New Mexico. The lowest temperature recorded in this section was 7° F. at Carlsbad.

Boll weevil survival.--Additional data on the effects of the unusually low temperatures on the mortality of boll weevils have been obtained since the report in the February News Letter. In Spanish moss collected in northeast Louisiana last fall, 189 live weevils per ton were found by R. C. Gaines and assistants, as compared with an average of 54 live weevils per ton during the previous 4 years (1935-38). In the examinations of moss from the same locality during March 1940, no live weevils were found and it is doubtful if any survived in moss in the vicinity of Tallulah; however, the examination of ground trash from woods near cottonfields showed different conditions. Last fall an average of 2,243 live weevils per acre were found in the ground trash and in March of this year 190 live weevils were found, or a survival of about 8.5 percent. Examinations of ground trash have been made for the last 5 years and only in the spring of 1939 has a larger number of live weevils been found in this material. In the spring of 1939, 225 live weevils per acre were found, representing a survival of about 15 percent. Nearly twice as many weevils were found in the ground trash during the fall of 1939 as in 1938 (2,243 versus 1,284 per acre), therefore we may expect as many weevils to emerge from ground trash in 1940 as emerged in 1939. As no live weevils have been found in the examinations of Spanish moss and no weevils have emerged to date in the hibernation cages, it appears that all of the weevils have been killed in such shelters as moss and cornstalks and that we will not find as many weevils in the cottonfields in May and June as were found in 1939. Similar examinations of ground trash at Florence, S. C., by F. F. Bondy and assistants, showed an average of 176 live weevils per acre in the spring of 1940, as compared with 3,582 in 1939 and 1,476 in 1938; however, some live weevils were active in the hibernation cages during March at this locality, in contrast to no activity at Tallulah, La. Eight active weevils were observed in the cages, as compared to 1,809 in 1939 and 1,168 in 1938. This was the fewest active weevils since March 1936, when only 5 were observed. The minimum temperatures at Florence were 2° F. in 1936 and 13° in 1940. At Tallulah the minimum temperature was -8° in 1940, the lowest recorded since the station was established there in 1909. The covering of snow, which lasted for 12 days, undoubtedly afforded considerable protection to weevils in ground trash at Tallulah, whereas the temperatures were not low enough at Florence to kill all the weevils in Spanish moss and cornstalk shelter.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Cotton planting in southern Texas and lower Rio Grande Valley of Mexico.--The acute drought in the lower Rio Grande Valley and Coastal Bend district continued until the latter half of March, retarding to a large extent the planting of the 1940 cotton crop. By the end of the month, however, all counties in southern Texas, as well as the regulated area on the Mexican side of the Rio Grande, had received sufficient moisture for planting, and this activity was going forward at a rapid rate wherever it was dry enough to get into the fields. Cotton planting in the lower valley area of south Texas is usually done from January to May, as sufficient moisture is received; therefore, in order to bring about a more uniform fruiting date, a regulation was issued by the State Department of Agriculture early in the year restricting cotton planting in that area to the period February 20 to April 1 for the 1940 season. However, in recognition of the severe drought in that area, which made it impossible to complete planting prior to April 1, the Commissioner of Agriculture issued a statement to growers on March 15 to the effect that additional time would be allowed for planting, and an order was later promulgated extending the date to April 20. By the end of March cotton was up on approximately 75,000 acres in the lower valley on the American side of the Rio Grande and was making rapid growth. It is estimated that this earliest cotton, planted February 20, will begin to put on small squares by April 20. On the Mexican side of the Rio Grande hundreds of cotton planters were in operation toward the latter part of the period, and it was estimated at the close of March that about 35 percent of the acreage had been planted. In the Coastal Bend district about 60 to 70 percent of the cotton acreage had been planted in Nueces County prior to the rains, but only a very small percentage had been planted in other counties of that district as a whole. At the end of March, however, planting was in progress over the entire district wherever the soil was dry enough to permit.

Destruction of sprout cotton in the lower Rio Grande Valley and Coastal Bend area.--For several months an intensive program has been under way in the lower Rio Grande Valley of Texas for the elimination of sprout cotton, in order to maintain a host-free period for the pink bollworm until the cotton planted in 1940 shall have reached the fruiting stage. During the first half of March from 16 to 18 grubbing crews were engaged in this work, which was interrupted on the 19th on account of heavy rains throughout the valley. During the period sprouts were grubbed from 9,934 acres, representing the most advanced growth in the area. This made a total of 73,009 acres grubbed since the beginning of this activity. A survey of the entire lower valley counties, which was made following the rains, showed that sprouts were making rapid advancement on account of very favorable growing conditions. The survey further showed that over half of the land planted to cotton in 1939 contained some sprout cotton, but none of these sprouts were found bearing fruit and, with the combined efforts of the farmers, who are cooperating in taking out sprout plants while they are working their lands, and our grubbing crews, it is believed all of these will be eliminated before they have an opportunity to put on fruit large enough to maintain the pink bollworm. When the rains began, all of the lands containing cotton sprouts left from plantings prior to 1939 had been covered and all visible growth removed. Work will be concentrated for the next few weeks in the 1939 fields. Later on, after the moisture has had time to bring out sprouts from any roots that remain on abandoned acreage, a final check-up will be made, which should eliminate those fields, totaling some 40,000 acres, from further consideration. Following the rains, considerable sprout cotton began to appear in some fields on the Mexican side of the Rio Grande. At the end of the period good progress was being made in the elimination of these plants, and it is hoped that the host-free period may be maintained in that area until the planted cotton reaches the fruiting stage. Only a comparatively few fields were found in the Coastal Bend district during the period where plants were beginning to put on new growth. Contacts were made with the farmers, and at the end of the month plants had been removed from the greater part of this acreage. As the result of rains in that area, planting operations are now going forward rapidly and it is believed the remaining cotton will be destroyed before fruit forms.

Pink bollworm program in Arizona.--Because of the excellent results obtained from the control program carried out for the 1938-39 crop season in the eastern part of the Salt River Valley, Pinal County, and the Santa Cruz Valley, in southern Arizona, it was considered advisable by State and Bureau officials to include the entire State of Arizona in such a program for the 1940 crop. This plan called for planting of the cotton crop, together with irrigation and cultural practices, in such a manner as to retard the fruiting of cotton until around the 10th or 15th of June; discontinuance of the practice of growing stub cotton throughout the whole of Arizona, and the elimination of all soca or sprout cotton on abandoned acreage or in fields planted in 1940. That part of the program having to do with stub cotton is for the purpose of creating a host-free period prior to the fruiting of cotton planted in 1940. In this connection, Agricultural Adjustment Administration authorities, in cooperation with this Bureau and with Arizona agricultural officials, included a provision in the 1940 conservation program whereby all cotton growers in Arizona are required to destroy stub or volunteer cotton not later than May 10. Farmers who do not comply with this regulation will be ineligible for conservation payments in 1940. This same rule, in regard to stubbing, was invoked by the A. A. A. last year, but covered only a part of the State. During the latter part of March stalks on 1939 cotton acreage were being rapidly destroyed in all areas.

Wild-cotton eradication.--Some years ago it was found that wild cotton existing in southern Florida and adjacent keys, involving approximately 16,000 acres, was heavily infested with the pink bollworm. Following this discovery, inspection of domestic cotton in northern Florida and southern Georgia revealed incipient infestations of the pink bollworm, which meant that this insect was making its way from wild cotton into the Cotton Belt. An undertaking was then begun to eliminate this menace by the eradication of its host, wild cotton, and excellent progress has been made. The second cleaning of the season was in progress at the beginning of March over most of the Florida area, and a third cleaning was under way on Key Largo. During a recent survey of the entire Florida Bay area a small colony of virgin cotton was found on Madeira Point, on the Dade County mainland. Inspection of 400 bolls taken from this cotton yielded 63 specimens of the pink bollworm. Incidentally, the section where this new cotton was found was directly in the path of the 1935 Labor Day hurricane, and excellent growing conditions had been created by destruction of the dense hammocks and undergrowth. Wild cotton was also found on several small keys during the rescouting of the Florida Bay area, where it did not occur prior to 1935, when a survey of that region was made. In the Cape Sable area, where the second cleaning of the season was started the first of the month, 4,020 acres was cleaned, 926 plants with mature bolls and 44,016 seedlings being removed. This is approximately one-tenth of the number of plants destroyed in that area during the first cleaning of the season. For the month, a total of 6,175 acres was cleaned in the Florida district, from which 1,958 plants with mature bolls, 57,068 seedlings, and 26 sprout plants were removed.

Thurberia-plant destruction.--A program was begun several years ago for the removal of Thurberia plants from the Tortillita Mountains and the southern slopes of the Santa Catalinas. This undertaking was determined upon when it was found that these plants were heavily infested with a boll weevil which was making its way to adjacent domestic cotton in southern Arizona. The Santa Catalina Range is now being covered for the second time. In one section of this range, which was burned over by a forest fire a few years ago, Thurberia plants have been particularly numerous. Most of the large plants were burned completely to the ground, but the stubs were not killed. Many of these stubs have put out new growth at a tremendous rate and the seedlings are particularly vigorous, this condition resulting possibly from the admittance of sunlight and enrichment of the soil by the considerable amount of ashes. During the period 4,720 acres was cleaned and 93,773 Thurberia plants were located and destroyed.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Early spring movement and medium population of beet leafhopper expected in southern Idaho.--J. R. Douglass and his associates at the Twin Falls, Idaho, laboratory, report that, after considering all pertinent factors at the close of March, it appears that an early movement may be expected of the spring generation of Eutettix tenellus (Bak.) from the desert breeding areas to the cultivated districts, but that only a medium population will be involved in this movement. This report gives all information available on probable E. tenellus populations in southern Idaho during the coming spring and early part of the summer and is not applicable to other areas. Early spring surveys of the desert breeding areas in 1939 showed the lowest overwintered population of beet leafhoppers since 1936. Growth of green tansymustard, an important spring-breeding host plant, was very sparse in most sections. The spring generation of beet leafhoppers in southern Idaho was very small, owing to the low population of overwintered leafhoppers and a scarcity of favorable host plants. The suitability of Russian-thistle, the most favorable host, was reduced, partly because the Russian-thistle was intermixed with downy chess, a nonhost, and partly because the summer host was stunted and dried prematurely, owing to the hot dry summer. This unsuitability of the summer host plant, combined with a very small spring generation, produced the lowest fall population of beet leafhoppers ever recorded in southern Idaho. Weather conditions during the first week of October were generally favorable for widespread germination of fall- and winter-host plants of the beet leafhopper; consequently, the beet leafhopper left its summer and hold-over hosts with little delay and entered the winter under favorable conditions. Deficient precipitation during the remainder of October, November, and December 1939, with above-normal temperatures for all 3 months, was unfavorable for survival of the fall-germinated plants. This resulted in a very scant, though general, stand of host plants available for food during the fall and early part of the winter.

Favorable weather conditions for a widespread germination occurred again near the close of February 1940, so that now conditions are favorable for a fair stand of spring-breeding host plants. Fall surveys in the Sailor Creek sagebrush area, one of the most important overwintering and spring-breeding areas, showed a very low late-fall population. The winter of 1939-40 has been mild and was dry up to the beginning of January. Excessive precipitation in January and nearly normal rainfall in February have kept the soil wet during the last 2 months. The lowest temperature recorded was 7° F., which indicates that the temperature conditions have been very favorable for survival of leafhoppers. Recovery from hibernation cages confirms this conclusion. Experience has shown that a mild winter and early spring, like 1933-34, advances the date of movement of the spring generation. It is possible, however, that if the present winter is followed by a cool wet spring, as in 1938, the movement of the spring generation will be delayed. As spring conditions greatly affect leafhopper populations and the time of movement, a second statement based on spring surveys will be issued later. Regardless of later weather conditions, relatively high populations may be expected, in cultivated sections close to breeding grounds. In summarizing, it may be stated that a low population entered hibernation under favorable conditions. The host-plant conditions varied from favorable to unfavorable and back to favorable during the fall and winter, with an outlook for a fair stand of spring-breeding host plants. The winter was favorable for survival of the leafhopper.

Control of cabbage caterpillars on fall cabbage.--W. J. Reid, Jr., of the Charleston, S. C., laboratory, summarizes the results of a control test conducted in South Carolina from August 1939 to February 1940, to determine the effectiveness, under conditions approximating the local production of fall-grown cabbage, of the control schedule that gave most promise in previously conducted experiments against the more common species of cabbage caterpillars. He states that, although the field involved in the test was exposed to the full effect of high cabbage-caterpillar populations, consisting principally of the cabbage looper, the imported cabbage worm, several species of Agrotinae including the corn ear worm and cutworms, a highly profitable crop of excellent quality was produced. The yield of the field, as indicated by samples taken, was as follows: (1) 11.2 tons of cabbage considered marketable as U. S. Grade No. 1, comprising 87.5 percent of the total yield, 52.5 percent of the total cabbage produced being classified as "extra-fancy," estimated to weigh approximately 5.9 tons per acre; (2) 5.5 percent considered not marketable as U. S. Grade No. 1, on account of caterpillar damage; and (3) the remainder, or 7.0 percent, considered unmarketable because of defects other than caterpillar damage, chiefly injury caused by low temperatures. The estimated cost of the insect-control treatments was $19.50 per acre and up to the close of March the sale of the crop had reached an average of $151 per acre. The cabbage was planted on August 2, the early part of the planting season for fall crops in the Charleston area. A total of 10 insecticide applications were made at approximately 10-day intervals from the time the plants came up until the caterpillar infestation ended with the advent of cold weather. The first of the applications was made on August 21 and the last one on November 15. The first 7 of these applications were made during the preheading stage of plant growth and consisted of the use of a dust mixture composed of 1 part of synthetic cryolite (containing approximately 83 percent of sodium aluminum fluoride) and 2 parts of talc at an average rate of 20.8 pounds per acre. In addition to the cryolite, the material used for the first 2 applications (the second of which was a repeat dusting necessitated by a 1.16-inch rainfall) contained 1.0 percent of rotenone, the rotenone being added in an effort to combat a heavy infestation of several species of leafhoppers. The remaining 3 insecticide applications were made during the heading period of the cabbage and consisted of a dust mixture containing 1.0 percent of rotenone with clay as a diluent, applied at an average rate of 22.4 pounds per acre. The results of this test corroborate those of previous experiments to the effect that fall-grown cabbage in South Carolina can be protected against caterpillars by using cryolite dust mixtures during the preheading period, followed by the application of dust mixtures containing rotenone while the cabbage is heading.

Potato or tomato psyllid fails to survive winter on red cedar in cages.--R. L. Wallis, of the Scottsbluff, Nebr., laboratory, reports that by the close of March complete mortality had occurred in the adults of Paratrioza cockerelli (Sulc.) placed in hibernation cages on red cedar last October. Examinations at weekly intervals disclosed that in November approximately 50 percent of the psyllids were dead in from 3 to 5 weeks after they were placed in the cages. By the close of December approximately 84-percent mortality had occurred. This indicates that P. cockerelli does not overwinter in red cedar, as was formerly supposed, or that weather conditions during the winter had afforded very unfavorable conditions for its survival on red cedar. Negative results were obtained in an attempt to determine whether P. cockerelli had overwintered on various green plants, such as evergreen trees, and in dried materials, such as leafmold, weeds, and under loose bark of various species of trees.

INSECTS AFFECTING MAN AND ANIMALS

Insecticide tests for control of Chaoborus larvae.--A. W. Lindquist, of the Nice, Calif., laboratory, reports the following results of laboratory tests with various insecticides: "Preliminary work last year indicated that Chaoborus larvae are killed by comparatively high dilutions of certain insecticides. More detailed work this quarter has shown good kills in the laboratory with pyrethrum, phenothiazine, carbon tetrachloride, trichlor ethylene, and certain mixtures of these. Over 90-percent kill was demonstrated at a dilution of 1/6,000,000 of a 15-to-1 pyrethrum. A pyrethrum solution containing 1.0 gram of total pyrethrin per 100 cc. in Diesel oil (3 parts) and carbon tetrachloride (2 parts) gave good kill in dilution of 1/10,000,000, and better than 60-percent kill at 1/30,000,000. Phenothiazine gave 100-percent kill at 1/4,000,000 and indicated a 100-percent kill or moribundity at 1/10,000,000. Phenothiazine inactivates Chaoborus larvae, and from all external appearances, the larvae are dead; but heart action and some gut action may continue for 3 weeks. Larvae may recover in 4 days."

Starlings attack grubs in cattle.--The following account of birds feeding on cattle grubs is reported by E. W. Laake, of the Dallas, Tex., laboratory: "One of the several cases reported in Texas of starlings attacking grubs in the backs of cattle occurred in the vicinity of Dallas. This interesting case occurred at the McCoy Dairy but did not come to our attention until March 21, when the dairy was visited by Mr. Wells, of this station. During the winter large flocks of starlings and blackbirds had gathered around the barn lots of dairies, resorting to the gleanings of feed which they could salvage. No doubt the number of the birds was increased by refugee flocks escaping the snow farther north. By the latter part of January the number of these birds was prodigious. About the first of February snow and ice covered the soil for a few days, and at that time many of the birds were observed to be pecking at some grubs in the backs of the cows. Fortunately only a few grubs were to be found in the cattle. The herdsman observed several instances of such attacks. The birds (starlings, he said) would peck into the lesion and, grasping the grub with the bill, would pull and jerk until, as he often observed, the grub was actually extracted. He believed that the birds were attacking only the grubs; he observed no cases where apparently the flesh of the host was sought. The cattle squirmed and moved about during the performance. He was sure that the lesions were not aggravated by subsequent pecking after the grubs were taken. Nevertheless, at the sites of the lesions attacked, on 8 or 10 of the cows, large, ugly infections occurred. Enormous swellings followed, without much suppuration. Eventually the skin sloughed away from the entire swollen area, disclosing a spongy, perforated mass. The lesion now was a wide, raw sore, from 1 to 8 inches in diameter. Eventually (in 4 to 6 weeks) the spongy center of the lesion sloughed out in a cone-shaped mass, leaving an open raw crater, which gradually healed. No more than 1 lesion occurred on any cow, but it may be that each of the victims had only 1 grub. Maggots had occurred in 1 of the lesions but had been controlled by applications of medicine."

FOREIGN PLANT QUARANTINES

Fruitfly on running board.--As an inspected car from Mexico was starting away at Hidalgo, a mango seed was seen in the corner of the running board next the car. The car owner said it must have been tossed there by some one else while he was in Mexico. A small amount of flesh surrounding a black spot on the fruit had been left uneaten. Upon inspection this very small amount of pulp on the seed yielded three dead and two live specimens of Anastrepha ludens (Loew).

Small boy has fruitfly larvae.--On Thursday afternoon, March 14, the Pan American plane came to a halt at the Brownsville airport. Among other passengers, hurrying off to be admitted and to arrange passage for a visit to other points in the United States, was a lady and her young son from Guatemala. The lady was passing Customs inspection while her son was enjoying a cold drink in the more or less inconspicuous background, when it was observed that the boy had something, probably of interest to us, in his coat pockets. He was called to accountability and removed from one coat pocket a piece of fruit claimed to be a "caimito," which was later identified as a star-apple (Chrysophyllum cainito) and a mango from another coat pocket, both having originated in Guatemala. Subsequent inspection disclosed the star-apple to be infested with larvae of Anastrepha sp.

Navy cooperates in inspection of airplanes from Hawaii.--When the U. S. S. Enterprise returned to San Diego during the month from Pearl Harbor, T. H., 82 airplanes flown from the vessel while several miles out at sea were inspected at the North Island Naval Airport several hours before arrival of the ship. Splendid cooperation given us by naval officials at the airport made inspection possible of this large number of airplanes in a comparatively short time.

Intercepted at the line.--When Rafael Torres, of Salt Lake City, Utah, crossed the international bridge at Laredo, Tex., on January 2, Inspector J. T. Watt found the following plant material concealed in his car: 4 jobo plums, 2 haw apples, 3 guavas, 3 sweet limes, 1 orange, 2 tangerines, ¼ pound green orange leaves, and 12 bulbs. He was fined $5 by Customs for petty smuggling.

Rice pest intercepted at Savannah.--On January 2, L. A. Mayer, inspector in charge at Savannah, picked up three dead beetles on the deck of the American S. S. *Steel Age*, which came from Calcutta, India, via Capetown, Union of South Africa. These beetles were identified as *Hispa boutani* Ws. This record is of interest because the original description records this species as very injurious to rice culture in Tonkin, and the presence of dead specimens on the deck of this ship would seem to indicate that the beetles were rather abundant at one of the ports of call.

Citrus blackfly intercepted.--Specimens of the citrus blackfly (*Aleurocanthus woglumi* Ashby) were intercepted at Boston on December 4, 1939, on two sour limes (fruits) in cargo from Dominica.

Correction for list of intercepted plant pests.--On page 46 of the "List of Intercepted Plant Pests, 1938," issued November, 1939, *Marmara* sp. should have been given as the pest intercepted on the hosts Cactus to *Phaseolus lunatus macrocarpus*, inclusive, under *Macrosiphum luteum*.

Entomological interceptions of interest.--Living larvae of the dark fruitfly (*Anastrepha serpentina* Wied.) were intercepted at Boston on February 27 in an orange fruit in ship's stores from Trinidad. A living adult of the tenebrionid *Salax lacordairei* Guér. was taken at New York on March 8 on paper packing for grapes in cargo from Argentina. Living specimens of the mite *Eriophyes tulipae* Keifer were found at El Paso, Tex., on November 29, 1939, on garlic in baggage from Mexico. A living adult of the weevil *Conotrachelus flavangulus* Champ. arrived at New Orleans on September 15, 1939, on a banana fruit in cargo from Nicaragua. Living specimens of the coccid *Asterolecanium urichi* Ckll. were taken at Washington, D. C., on July 12, 1939, on a leaf of *Guilielma speciosa* in express from Brazil. A living adult of the chrysomelid *Metriona tuberculata* (F.) was intercepted at Seattle, Wash., on January 5 with banana debris in cargo from Guatemala. A living specimen of the cicadellid *Empoasca solani* DeL. was found at Laredo, Tex., on December 29, 1939, on Swiss chard (*Beta vulgaris cicla*) in baggage from Mexico. A living adult of the chrysomelid *Pseudomesomphalia punicea* (Chev.) was intercepted at San Francisco on November 10, 1939, on *Musa* sp. in cargo from Guatemala. A living specimen of *Chirothrips falsus* Priesner was taken at Brownsville, Tex., on October 21, 1939, on an orchid in cargo from Mexico. A living adult of the weevil *Sitona lineata* L. was intercepted at Philadelphia on November 20, 1939, on Chinese cabbage (*Brassica chinensis*) in ship's stores from the Netherlands.

Pathological interceptions of interest.--*Ascochyta* sp. (no species described on orchids) was intercepted at Seattle on March 8 and 12 on *Cymbidium cusifolium*, *Cypripedium callosum*, *C. fairieanum*, *C. hirsutissimum*, *C. parishii*, and *C. spicerianum* from India. A form of *Aspergillus niger* Van Tieg, producing sclerotia, was intercepted on sour limes from St. Lucia, British West Indies, on October 31, 1939, at New York. Citrus canker

(*Bacterium citri* (Hasse) Doidge) was intercepted on pomelo from Siam on October 21, 1939, at New York and from Java on February 13, 1940, at Boston; on rough lemon from Java on March 4 at Boston; and on sour lime from the Philippines on March 5 at Philadelphia. *Cercospora musae* Zimm. was intercepted at Brownsville on February 19 on the first shipment of bananas from a Mexican area near the Guatemalan border. *Cercospora rhododendri* March and Verpl. was intercepted at Seattle on October 21, 1939, on rhododendrons from Canada. *Helminthosporium allii* Campanile, which is frequently found on garlic, was intercepted on onion from Mexico four times during March at Brownsville. *Heterodera marioni* (Cornu) Goodey was intercepted on *Daphne genkwa* from Japan on February 14 and on *Jasminum* sp. on February 21 from Italy, at San Francisco. *Mycosphaerella citrullina* (Smith) Gross. was found on *Momordica charantia*, cucumbers, chayotes, and melons during the winter shipping season at New York. Most of the shipments were from Cuba but Holland, Italy, Jamaica, and Portugal were represented also. An undetermined species of *Phoma*, previously intercepted from Syria, was found on chayotes from Mexico on October 31, 1939, at El Paso. *Phragmidium rosae-acicularis* Liro was found on leaves of rose plants from Canada on October 28, 1939, at Seattle. *Phyllactinia corylea* (Pers.) Karst, was intercepted on November 21, 1939, at El Paso on locust leaves from Mexico. *Puccinia heterospora* B. and C. was intercepted at El Paso on November 8 and 10 on leaves of weeds belonging to the genus *Anoda* of the mallow family. *Pucciniopsis caricae* Earle was found to be more or less general on a number of shipments of papayas from Cuba arriving at New York in February and March. *Septoria darrowii* Zeller was intercepted on blackberry leaves from Mexico on November 15, 1939, at El Paso. Sterile leaf spots apparently caused by *S. hydrangeae* Bizz. were found on hydrangeas from Mexico on October 30, 1939, at El Paso. *S. lycopersici* Speg. was found on tomatoes from Mexico on November 8 at El Paso. The same disease was found on tomatoes in the field in Hawaii on February 5. *Mycosphaerella rubi* Roark and *Septoria rubi* Westd. were found on raspberry leaves from Mexico on November 11, 1939, at El Paso. *Uromyces caryophyllinus* (Schrank) Wint. was intercepted on carnations from Guatemala at a Brownsville airport in February.

Spotted cattails from Mexico.--Cattails are used as packing for fish from Mexico. For several years specimens of these cattails with sterile spots have been sent in for determination. During October, November, and December such specimens from El Paso were found to have some spots on which fruiting bodies had begun to form. Thus far these fruiting bodies have not been determined to species but they belong to a species of *Gloeosporium.* It is hoped that better material will become available at some time, so that determination or description of the species will be possible.

DOMESTIC PLANT QUARANTINES

Mormon cricket hatch necessitates dusting.--The first report of Mormon crickets hatching this year came from Malheur County, Oreg., on March 8, the identical date on which the first hatch in 1939 was reported from Klickitat County, Wash. By March 14, this year, hatching was reported from various places in Oregon and Washington, and from five counties in Nevada. In Montana hatching occurred the week ended March 23, and reports from Utah came a week later. Dusting was begun on March 25 in the vicinity of Halfway, Baker County, Oreg., employing both hand and power dusters, and 45 C. C. C. men were being assigned by cooperative Federal agencies to assist in these operations.

Grasshopper hatch in California.--Grasshoppers of migratorial tendencies (Melanoplus mexicanus Sauss.) were starting to hatch on March 8 in Palo Verde Valley near Blythe, Calif. From Kern County entomologists reported that on March 28 Schistocerca vaga Scudd. was being found in the adult stage and others in the first and second instars. The situation as to these infestations was well in hand, however, according to the county agricultural commissioner.

More aircraft on control projects.--Four additional airplanes have been purchased by this Division, two light aircraft for scouting primarily in areas where grasshoppers with migratorial tendencies occur, and two biplanes, one for use in distributing grasshopper bait and the other in applying dust over areas for such pests as the white-fringed beetle and the Mormon cricket. Grasshopper baiting by autogiro and biplanes proved successful in the summer of 1939, over rough territory impracticable to reach with mechanical spreaders. During that season, a cub plane was used effectively for contacting ground workers to direct application of bait, and for scouting and survey work in Texas and adjoining States. In eastern Montana and western North Dakota, planes were contracted for bait spreading primarily over brushy river and creek bottoms. A summary of operations for the 1939 season shows that 5,000,000 pounds of grasshopper bait was spread over 260,000 acres, with the use of 14 airplanes, at a cost of 23.6 cents per acre. Airplanes were also used last year for spreading calcium arsenat dust over large areas of waste land in the outlying districts of New Orleans for controlling infestations of the white-fringed beetle. A more uniform coverage was obtained than by other methods of dusting, and the use of aircraft was found to be a very satisfactory way of treating a large expanse of waste land or of areas overgrown with thick vegetation.

Organizational work on 'hoppers and crickets goes forward.--Meetings to work out cooperative procedures in each of the various States were held in February and March, in 17 infested States, by Federal and State officers engaged on the control of crickets and grasshoppers, and memoranda of understanding are being completed. The State Leaders Committee, which had been appointed to work in a liaison capacity, met at the field headquarters office in Denver on February 27-28. Committee members from Minnesota, Montana, Nevada, Colorado, and Kansas were present. Field supervisors in Colorado, South Dakota, and North Dakota have conducted publicity and organizational meetings. In Colorado alone, 48 such meetings have been held.

Egyptian alfalfa weevil.--Scouting for the Egyptian alfalfa weevil in March resulted in finding additional infestations in the Winterhaven area of Yuma Valley, Calif. Larvae and pupae continued to be found in the University of Arizona date garden at Tempe, and damage to sourclover and bur-clover was evident at several points. Scouting in alfalfa areas and sweeping sourclover and bur-clover along the main routes of travel in five counties in southern California resulted in finding no new infestations.

Larval survey for white-fringed beetle.--In order to obtain an indication of the population of the white-fringed beetle, as compared with 1939, a larval survey was made in March on a number of properties in the infested areas at New Orleans, La., and Gulfport, Saucier, Laurel, Carriere and Bolton, Miss. Square-foot samples, dug 8 inches deep, were taken at favorable spots and the soil carefully examined. Last year the samples taken in May and June in these same localities showed an average population of 14.37 larvae per square yard. This year the survey in March gave an average of 5.07. It is realized that larval populations vary with several influencing factors. It is apparent, however, that the control measures of the past year have effected a substantial reduction in the beetle population. At Mobile, Ala., Baton Rouge, La., and Bolton, Miss., points where eradication is being attempted, but 3 larvae have been found this year. These were in the Mobile area.

Land clearing for white-fringed beetle control.--Over 1,000 acres of brushland heavily infested with the white-fringed beetle, in the vicinity of New Orleans, was cleared in March in an excellent manner by W. P. A. labor. This work is enthusiastically received by local residents, by police and fire departments, and by health authorities, as bringing about improved conditions in their fields of work. While on this clean-up work, the W. P. A. workers were responsible for saving the life of a young woman found starving and unconscious in a remote shack. A Federal-State W. P. A. project has been approved for similar work in Mississippi.

Other activities under white-fringed beetle project.--Regulatory activities were greatly increased in March, owing to spring demand for nursery stock and the movement of soil in road construction. Some quarantine violations were intercepted. There was considerable activitiy on the part of New Orleans nurserymen in making their plants eligible for certification, and 72 units meeting certification standards for plunging and growing beds were completed and placed in operation during the month. In the Monroeville, Ala., area, arrangements have been made with operators of all the larger farms, in planting their corn and beans, to leave out every thirtieth row so that the power dusters may pass without damaging crops. On March 15 a meeting was held at New Orleans with nurserymen and others concerned with the white-fringed beetle quarantine regulations. Pest-control officers of Louisiana and Georgia were present, as well as a number of Bureau representatives. The 1940 control program was discussed and it was arranged that a committee of nurserymen and of other affected interests meet at regular intervals with the project workers to consider problems arising from the conduct of the control work at New Orleans.

Methyl bromide treatment for white-fringed beetle modified.--The instructions in circular B. E. P. Q. 503, issued on November 21, 1939, provided for treatment of nursery stock by a solution of methyl bromide for larvae of the white-fringed beetle and limited the treatment to balled and burlapped nursery stock with soil balls not larger than 6 inches in diameter, and provided for an exposure of 24 hours at temperatures of 70°F. or above. As a result of more recent investigations, the instructions are now revised to provide that soil balls 7 inches in diameter may be so exposed for 8 hours at a minimum temperature of 65°, for treatment of larvae of the more common species of the beetle, Pantomorus leucoloma Boh. The revised circular became effective March 15.

Peach-disease work program for 1940.--In general the 1940 work policies on the Federal-State phony peach and peach mosaic disease projects will be the same as those of last year, continuing the three general phases as follows: (1) Inspection of nurseries and their environs within a radius of a mile, and in the case of the mosaic disease, inspection also of budwood sources and such environs; removal by May 15 of all mosaic trees, and by June 30 of all phony trees from the 1-mile zones of nurseries. In the mosaic area, reinspection will be made of peach nurseries in the fall, prior to defoliation. (2) Orchard inspection and the removal of diseased trees from orchards. (3) Removal of escaped and abandoned trees. Geographically, the plans include the reinspection for the phony peach disease of all properties found infected since 1937, and those adjacent, in Illinois, Kentucky, Arkansas, North Carolina, South Carolina, Tennessee, Texas, and Missouri. Complete inspection, including yard trees and orchards in areas of Georgia, Alabama, Mississippi, and Louisiana, is proposed. In the mosaic area the plans provide for complete inspection and eradication of diseased trees in the lightly infected areas in Arizona, Colorado, Oklahoma, Texas, and Utah; intensive orchard and yard inspections in the commercial area of southern California and the more important commercial area of New Mexico; surveys beyond known limits of infection and attempt to eradicate any incipient infection found, conditioned on available funds and trained personnel; educational work in New Mexico, Texas, and Arizona, in cooperation with county agents, and State pest-control officials, to acquaint growers with the seriousness of the mosaic disease and the necessity for removing infected trees.

Over 81 million peach trees removed under the two peach-disease projects.--A summary of tree-removal work, which has been carried on for the control of phony peach and peach mosaic diseases from August 1935 to the close of the year 1939, shows that 81,209,992 abandoned and escaped host trees have been destroyed. These were growing on 185,000 properties in 17 States. The work has been accomplished by relief labor. Such labor has been made available for continuing the work in 1940 in Alabama, Arkansas, California, Colorado, Georgia, New Mexico, South Carolina, Tennessee, Texas, and Utah.

Three States modify their peach quarantines.--Following the recent announcement of the results of the cooperative inspection in 1939, in which it was found that the phony peach quarantine restrictions could be lifted from 2 entire States and 24 counties in other States, the pest-control officials of Alabama, Illinois, and Missouri have revised their quarantines to modify the area according to 1940 standards. Uniformity of quarantine action is maintained by these States.

Peach mosaic in the last 4 years.--The peach mosaic work of the last 4 years, as summarized by counties, shows that inspection has been conducted in 679 counties of 25 States. The 52 counties found infected in 1939 represent a decrease of 11 counties in the number found infected in previous years.

Sweetpotato weevil being eradicated.--Gregg and Shelby Counties, Tex., were released in March from quarantine on account of the sweetpotato weevil, no such infestations having been found in these counties for a year. With the apparent eradication of the weevil from these two counties, and from Upshur and Smith Counties a year ago, it is believed that a weevil-free zone of approximately 75 miles from the more extensive commercial plantings in northeastern Texas has been created through the Federal-State campaign activities.

Transit-inspection activities.--The State of Michigan has assigned an inspector to pinch-hit with the regular inspector at Detroit for a period of 2 months, and a Nebraska State inspector is assisting on transit inspection at Omaha. The Easter shipping of both cut flowers and potted plants through Jacksonville, Fla., was described by the transit inspector as "probably the largest movement we have ever had through this station." At Kansas City, Omaha, and Council Bluffs the volume of Easter mail was the largest in the history of these stations, according to reports of transportation officials, and the express movement through Kansas City reached similar proportions. Narrative reports of the inspectors at each of the stations are being circularized among all the inspectors and are proving of value and interest to the men, many of whom are working alone. Better reports are also being sent in since this practice was put into effect.

Looking under the label.--While inspecting plant material arriving at Detroit for the flower show there March 23-31, transit inspectors found a shipment of 6 wooden boxes well plastered with labels reading "orchids." As the shipment came from an area heavily infested with Japanese beetles, the boxes were opened up to determine whether they might contain plants subject to restriction. One such box was found to contain 24 rooted plants in soil and without Japanese beetle certificates. At Saint Paul, another shipment without beetle certification was caught by the transit inspector. The interception of such shipments found far beyond the boundaries of the infested areas is considered, as one inspector puts it, "something to write about," in view of the possibility of infestation becoming established at outlying points.

Peach mosaic quarantine violations found.--Several shipments of plum stock, moving in violation of standard quarantines on the peach mosaic disease maintained by the infected States, have been found by the transit inspectors at Dallas and Memphis. Plant-pest-control officials of the States of origin and destination have been notified by telegram of these violations, for such action as the situation requires.

Progress in citrus canker inspection.--The force of 6 Bureau inspectors and 3 State men working in Louisiana in March inspected over 1,000,000 citrus trees on over 1,000 premises. Properties found infected in recent years in 9 Louisiana parishes were reinspected in March without finding citrus canker. No general tree-removal work is being conducted in Louisiana, but *Citrus trifoliata* trees found on or near properties previously infected are being destroyed by the inspectors. The white flowers on these trees, known locally as wild orange or wild lemon, make them easy to spot, even in thickly wooded areas. In Texas tree-removal and inspection work was conducted in Harris County in March.

CONTROL INVESTIGATIONS

Mixture of o-dichlorobenzene-naphthalene effective when applied in aerosol form.--W. N. Sullivan, E. R. McGovran, and J. H. Fales, in cooperation with L. D. Goodhue, of the Division of Insecticide Investigations, report promising results from applying these well-known insecticides in a new manner. In a preliminary test 80 cc. of a naphthalene-o-dichlorobenzene solution (0.3 gr/cc) was sprayed on a hot plate (temperature 175° C.) in a Peet-Grady chamber (216 cu. ft.) over an 8-minute period.

A dense smoke or fog was produced, containing among other particles minute crystals of naphthalene (?) seemingly in colloidal suspension in air. However, 3 hours after the test started there was no visual deposit resulting from this treatment. After a 24-hour-exposure period mortality was recorded and the insects were fed and held for a 4-day count. The insects were tested, and effectiveness of this treatment is given in the following table.

Test No.	Concentration used	Insect	Insects	Mortality in--	
				1 day	4 days
			Number	Percent	Percent
1 a---	24 grs. in 80 cc. solution	Periplaneta americana (nymphs and adults)	160	77	100
1 b---	do.	Musca domestica (adults)	600	100	--
1 c---	do.	Tribolium confusum (adults)	249	100	--

The results indicate a practical control for roaches, houseflies, and flour beetles at a concentration of about 375 grams material per 1,000 cubic feet of fairly tightly enclosed space. As the cost of this treatment is roughly 10 cents per 1,000 cubic feet, and as the material is relatively nonpoisonous to humans but highly toxic to insects, relatively noninflammable, and has considerable penetrating power, it is believed that this method of treatment has possibilities for use under certain conditions.

INSECTICIDE INVESTIGATIONS

Cooperative testing of organic compounds.--The Bureau of Home Economics, mindful of the work being done in the Division of Insecticide Investigations with the preparation of a large number of organic compounds for testing against insects by cooperating entomologists, has requested that these compounds be made available to them for testing as mildew-proofing agents. According to a cooperative agreement, this will be done to as great an extent as is feasible with regard to cost and convenience of preparation. A somewhat similar arrangement is being made with the Public Health Service for making available to them numerous organic compounds for testing as possible remedies for trichinosis.

Survey of particle size of lead arsenates.--L. D. Goodhue has just had published in the Journal of Economic Entomologists (v. 33, No. 1, pp. 170-2. Feb. 1940) the results of an investigation of 16 brands of lead arsenate with regard to their relative fineness. The results were obtained by the sedimentation technique and hence reveal the distribution of sizes within each sample. Only 2 of the products contained more than 1 percent coarser than 40 microns diameter, but all but 1 showed appreciable quantities between 10 and 20 microns. The differences are perhaps best illustrated by stating that the proportion smaller than 1 micron diameter ranged from 10 to 60 percent by weight. It is evident that lead arsenate is in general a very finely divided material.

BEE CULTURE

Growth rate of queenbee greater than that of worker bee after early larval life.--R. M. Melampy, University, La., reports that queen and worker honeybees have the same approximate growth rate during early larval life, and then the growth of the worker is retarded, as shown by the nitrogen, total lipid, and total reducing substances (calculated as glucose), and calorific value. In certain studies the queens attained a maximum live weight of more than 260 mg. during development, whereas workers attained only 144 mg. The highest percentage of dry matter and the lowest percentage of water in the queens occurred at about the fifth day, although the absolute amounts of dry matter and water per individual insect were both at a maximum at this stage. The queens reached a maximum nitrogen content of 5.7 mg. per individual and the workers one of 2.1 mg. The highest total lipid content of the queen was 12.8 mg. per individual, whereas that of the worker was 5.4 mg. Total reducing substances reached their maximum on about the sixth day of development, the amount per queen being 13.2 mg. and that per worker 12.1 mg. The calorific value per gram of dry tissue of both castes increased during the larval period and decreased during the pupal stage. The ash content of the prepupal and pupal stages of the worker was approximately five times that of the queen. The two castes appear to be thresholds of development, owing to a difference in larval feeding, as both queens and workers have the same general gene complex.

Unanticipated difficulty experienced in inoculating colonies from untested stock with American foulbrood.--S. A. McGregor, Hope, Ark., reports: "The difficulty in getting bees inoculated with American foulbrood by a well-established method of inoculation constitutes one of the most interesting developments in work being conducted on bee disease resistance at Hope, Ark., by the Division of Bee Culture in cooperation with the University of Arkansas Fruit and Truck Branch Experiment Station. Ten times the minimum inoculation dose of 500,000 spores per cc. in a liter of sugar sirup, as established by A. P. Sturtevant, of the Intermountain Bee Culture Laboratory at Laramie, Wyo., was fed to colonies of bees under test at Hope. These colonies were headed by queens from 10 queen-breeders selected more or less at random from different parts of the United States and the queens had no past history of disease resistance. When disease failed to appear as expected in these colonies a second inoculation of 10 times the minimum inoculation dose was given about 4 weeks after the first one. A few of the colonies even received a third inoculation. Of 100 colonies established records of disease resistance were obtained on 85. The other 15 lost their queens and were discarded. Of these 85 the following records were obtained:

34, or 40 percent, showed no disease (negative)
51, or 60 percent, showed evidence of disease (positive)
41, or 48 percent, recovered from the disease (recovery)
75, or 88 percent, either showed no disease or recovered (negative plus recovery)
10, or 12 percent, failed to recover.

UNIVERSITY OF FLORIDA
3 1262 09244 4941

"These results are more startling when compared with data obtained at the Laramie Laboratory and the Iowa Experiment Station at Ames. At these two stations only strains of bees from parents showing a high degree of resistance to American foulbrood were tested. At Ames 90 percent of the colonies were either negative or recovered, and at Laramie only 67 percent of the colonies were either negative or recovered. A difference in strains was revealed at Hope, one strain showing only 1 cell of disease in 9 colonies tested, another strain showing disease in all 9 colonies tested, 3 of which failed to recover. All of the colonies receiving 3 inoculations either did not contract the disease or recovered. No reason for the high degree of resistance at Hope has as yet been found, but in 1940 another series of tests will be conducted nearby, but on a different type of soil to determine whether soil has any relation to the disease resistance."